

Interactive comment on “How representative are FLUXNET measurements of surface fluxes during temperature extremes?” by Sophie V. J. van der Horst et al.

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We thank Reviewer 1 for their comments and respond below point by point.

General comments: The manuscript by van der Horst et al., poses an interesting question about the FLUXNET data and about the representativeness of the flux measurements during temperature extremes.

Author response: Thank-you!

While the topic is of interest in particular to the modelling community, I have a major concern about their approach. The authors explore data availability at each measure-

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ment site based on the availability of the temperature, sensible and latent heats, and NEE data. They take the ratio of the available data for heat (latent or sensible) or NEE, relative to the available temperature data, also accessed through FLUXNET, to compare sites.

Author response: Yes, this is correct: our aim with this study was to independently assess the availability of the measured surface energy and carbon fluxes during extreme conditions.

My questions is why did the authors not use complete temperature records (from meteorological or remote sensing products) for each site to compare with the absolute availability instead of taking a relative proxy that is a biased by the quality of temperature measurements and is not comparable between sites? The authors themselves suggest this approach to the modelling community in lines 31-33.

Author response: There are often many ways to approach a problem and each method has different strengths and weaknesses. In our approach, we were particularly motivated by how these data may be used to develop and evaluate models. Given this motivation, there is no need to generate a complete temperature record, instead our aim was to assess whether during conditions one could run a model (i.e. because we have meteorological forcing data), whether we have matching surface energy and carbon fluxes with which we could evaluate the model output. In revision we will make this case much clearer for the reader.

Author response: The Reviewer was also concerned how differing availability of measured temperatures across sites might bias a site-to-site comparison. This is a fair question although we don't necessarily agree that it affects our motivated comparison (see above). Nevertheless, in revision we will investigate this further and add some appropriate text to the manuscript.

Specific comments: Page 1 Line 17: Why not using the Tier 2 dataset that is more complete, if this study is focusing on data availability?

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Author response: We did not use Tier 2 for the simple reason that the Tier 2 data set is not freely available to the community. Those with access to Tier 2 data can use our codes to reproduce our results but we could not use Tier 2 due to the access policies inherent in those data.

Page 1 Line 22: Perhaps they mean the “availability” of temperature and not “measurement ratio”. Measurement ratio for temperature would be 1 based on their description.

Author response: We will clarify the associated text in the revised manuscript.

Page 3 Lines 5-6: Exactly for this reason, the measurement ratio is relative to each site and cannot be compared across sites.

Author response: As noted above, we will address this in our revised manuscript.

Page 9 line 8: Indeed. But, in my opinion, the authors should have assessed the quality of the flux data independently of the quality of temperature data since the two are measured separately.

Author response: As stated above, this is perhaps a question of different motivations; our aim was never to assess the temperature record. We acknowledge the reviewer’s opinion and we do respect that they may have different motivations here. In revision we will ensure our motivation and framing of the paper is clearer. We will also attempt to address the impact of any biases in temperature record on our results.

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